SYSTEM AND BUILDING FOR GENERATING ELECTRICITY USING WIND POWER

TECHNICAL FIELD OF THE INVENTION

[0001] The present invention relates in general to the field of energy conservation and electricity production in and around buildings for use in residential, commercial and other area, and more particularly, to a system and building that use the wind in and about a structure to generate electricity.

BACKGROUND OF THE INVENTION

[0002] Without limiting the scope of the invention, its background is described in connection with wind-power generating structures, as an example. During the past decade the need for alternative energy generation has increased in dramatic fashion. With the increase in foreign oil dependency, uncertain oil prices, environmental concerns and the lack of sufficient energy supplies as seen recently in California, for example, there is an unmet demand for cost-effective alternative energy supplies. One such alternative energy supply is the use of wind-powered generators to augment other more conventional sources of electricity for both residential and commercial use.

[0003] Heretofore, in this field, structures that have wind-powered generators have not been constructed as an integral part of the structure. Examples of prior wind-power generating structures include windmills and similar structures, which are not aesthetically pleasing and are prohibited under building codes in most urban areas. One of the main problems with existing buildings that incorporate wind-powered devices is that they fail to maximum the use of windflow or airflow volume as enhanced by the interior and exterior of

the building itself. More particularly, buildings merely use the building structure to vector and channel windflow or airflow volume from only an external wind input to a more concentrated windflow or airflow. Thus, buildings are not designed to vector airflow from both internal and external sources into one area of the building or structure. Only external airflow is used and augmented by vectoring using relatively narrowed corridors that form part of the building or wind vanes that are attached there to. These structures only concentrate external airflow that may be harnessed by a wind-powered generator.

[0004] In addition, most buildings are designed and built without any provision for generating electricity from the wind. As a result, most building owners do not consider adapting their building to generate electricity from the wind because wind-powered systems are expensive, unaesthetic and/or require extensive modifications to the building.

[0005] Accordingly, there is a need for a system and building that incorporates and integrates the entire building to generate electricity. In addition, there is a need for a system that can be integrated into an existing building that was not previously designed to generate electricity from the wind.

SUMMARY OF THE INVENTION

[0006] The present invention provides a system and building for generating electricity using wind power. The present invention incorporates and integrates the entire building to generate electricity. In addition, the present invention provides a system that can be integrated into an existing building that was not previously designed to generate electricity from the wind. As a result, virtually any building can be retrofit to generate electricity at a reasonable cost and without extensive modifications to the building. The present invention

can be easily incorporated into new building designs or added to existing building without significantly altering the aesthetics of the building. The present invention makes wind-power a viable addition to residential and commercial buildings.

[0007] In one embodiment, the present invention provides a system for generating electricity from a wind that includes an enclosure, a wind turbine and two or more air ducts. The enclosure, which is to be mounted within or in close proximity to a building, has an air intake and an air exhaust. The wind turbine generates electricity from the wind received from the air intake and is disposed within the enclosure between the air intake and the air exhaust. Each air duct has a first end connected to an air duct intake device and a second end connected to the enclosure air intake.

[0008] In another embodiment, the present invention provides a building adapted to generate electricity from a wind having an enclosure, a wind turbine and two or more air ducts. The enclosure is disposed within or in close proximity to the building and has an air intake and an air exhaust. The wind turbine generates electricity from the wind and is disposed within the enclosed space between the air intake and the air exhaust. Each of the two or more air ducts has a first end connected to an air duct intake device mounted on an exterior of the building and a second end connected to the enclosure air intake. Using both internal and external intakes, both the structure and internal convection current are used to increase the airflow and consequently the power generated by the wind turbine.

[0009] In yet another embodiment, the first end of the two or more ducts has a larger cross sectional area than the second end of the two or more ducts. The invention may also use an intermediate duct disposed between the enclosure air intake and the second ends of the two

or more ducts. To protect the components of the system and maximize airflow, the air duct intake device may include a grill mounted on an exterior of a building to prevent the entry of rodents and other unwanted intruders. Externally, the air duct intake device may include an air scoop, with one embodiment using a directional inlet that changes position in favor of the wind direction, which may even be controlled remotely.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] For a more complete understanding of the features and advantages of the present invention, reference is now made to the detailed description of the invention along with the accompanying figures in which corresponding numerals in the different figures refer to corresponding parts and in which:

Figure 1 discloses one embodiment of the present invention that shows a structure or building illustrating the use of both external and internal airflow;

Figure 2 discloses one embodiment of the present invention that shows another structure or building illustrating the use of both external and internal airflow;

Figure 3 discloses one embodiment of the present invention that shows another structure or building illustrating the use of both external and internal airflow;

Figure 4 discloses one embodiment of the present invention that shows another structure or building illustrating the use of both external and internal airflow; and

Figure 5 discloses one embodiment of the present invention that shows another structure or building illustrating the use of both external and internal airflow.

DETAILED DESCRIPTION OF THE INVENTION

[0011] While the making and using of various embodiments of the present invention are discussed in detail below, it should be appreciated that the present invention provides many applicable inventive concepts that may be embodied in a wide variety of specific contexts. The specific embodiments discussed herein are merely illustrative of specific ways to make and use the invention and do not delimit the scope of the invention.

[0012] The present invention provides a system and building for generating electricity using wind power. The present invention incorporates and integrates the entire building to generate electricity. In addition, the present invention provides a system that can be integrated into an existing building that was not previously designed to generate electricity from the wind. As a result, virtually any building can be retrofit to generate electricity at a reasonable cost and without extensive modifications to the building. The present invention can be easily incorporated into new building designs or added to existing building without significantly altering the aesthetics of the building. The present invention makes wind-power a viable addition to residential and commercial buildings.

[0013] Turning now to Figure 1, one embodiment of the present invention is disclosed that shows a structure or building 10 illustrating the use of both external and internal airflow. The structure or building 10 may be either a residential or a commercial building well known to those of ordinary skill in the art in the construction and real estate industry. The building 10 may be manufactured of any conventional building material such as wood, brick, concrete or metal. Located within the building 10 is an enclosed space or enclosure 20. The enclosure 20 may be a typical attic of a residential building 10 or of any open area within a

commercial building 10. The enclosure 20 may also be a smaller enclosed space within the attic of the residential building 10 or open area within a commercial building 10. The enclosure may include sound insulation. Enclosed within the enclosure 20 is a wind turbine 30 of any commercially available type that is of suitable size and strength for use with the present invention. Wind turbines of this type are well known to those of ordinary skill in the art and may also be referred to as wind generators or wind turbine/generators. The wind turbine 30 of the present invention may also be located and mounted in either a horizontal or vertical manner and may be constructed of noise dampening and vibration dampening materials in order to reduce the amount of noise and vibration created by the generation of electricity from the wind turbine 30. Alternatively, the wind turbine 30 can be mounted on a vibration dampener (not shown).

[0014] The present invention may also include a processor or controller (not shown), such as a computer or programmed logic controller, for monitoring and controlling the wind turbine 30. The wind turbine 30 may also be controlled by a building central computer or processing unit that regulates the generation of electricity based upon the needs of the building 10 itself. The wind turbine 30 of the present invention will be connected in a conventional manner to the power supply of the building 10. The wind turbine 30 may also be connected to the power supply of the building 10 in such a way that allows excess power to be sold back to the utility company when the power generated by the wind turbine 30 exceeds the power requirements of the building 10 (e.g., windy nights).

[0015] Connected to the wind turbine 30 of the present invention, in one embodiment, two or more air ducts 40 having both first and second ends. The air ducts 40 have air intake openings 50 attached at one end of the air ducts 40, the air intake openings 50 funnel the air

through the air ducts 40 until it reaches the wind turbine 30 for generating electricity. In at least one embodiment, the air intake openings 50 are of a scoop-type construction, which allows more air to enter the air ducts 40 that is found in a normal circular or other type of opening disposed on the outside of the air ducts 40 of the building 10. In one embodiment, the air intake opening scoops 50 have directional inlets that change the direction the scoop 50 points to align itself with the direction the wind is blowing. Although, the air intake scoops 50 can be placed anywhere on the building 10, the air intake scoops can be strategically located on the building 10 to take advantage of higher airflows on and around the building 10 that are caused by the building 10 itself, such as roof ridge tops and intersections, along building lines and under roof eves at the top of an exterior wall. Moreover, small ridges or other wind breaks can be used to funnel and force wind into the scoops 50. These wind breaks or channeling means can be incorporated into the design of the building 10 to minimize any undesirable aesthetic effect.

[0016] In at least one embodiment of the present invention, other air ducts 40 have a greater cross-sectional diameter near the air intake openings 50 that decreases gradually along its length. This change in cross-sectional diameter allows for a Venturi effect thereby increasing the velocity of the air that enters through the air intake opening 50 before it reaches the wind turbine 30. Having a greater airflow, this design, creates more electricity to be generated by the wind turbine 30. Similarly, additional airflow can be obtained by joining additional air ducts (not shown) having a smaller diameter than the main air ducts 40 to the main air duct 40 at an acute angle, such as thirty degrees, to create a vacuum effect in the smaller air duct.

[0017] As the air passes through the wind turbine 30 it generates electricity, which is then connected in any conventional manner to the building's 10 normal utilities (not shown). Any excess electricity may be stored in batteries or other storage devices for later use. In one embodiment, the wind turbine 30 may generate sufficient electricity to supply all of the power requirements of the building 10. In an alternative method the excess electricity generated by the wind turbine 30 from the airflow may be sold back to a public utility in order to reduce the cost of the energy supply for the building 10.

[0018] Also shown in Figure 1 is that the building 10 has a typical exhaust vent 60 for the airflow to exit the wind turbine 30. The excess airflow exits the enclosure 20 of the building 10 after having gone through the wind turbine 30. In one embodiment, some or all of the airflow from exhaust vent 60 may be redirected back into one of the air ducts 40 to provide additional airflow. Additional sources of airflow may also be obtained from vent pipes by directing the exhaust from dryers and air conditioning units into the enclosure 20. In addition, the warm or hot air in the top of an attic can be collected and directed into the enclosure 20.

[0019] Turning now to Figure 2, a second embodiment of the present invention is shown. In this embodiment the wind turbine 30 is also located within the space 20 which may be an attic of the building 10. Figure 2 also discloses an air intake opening 50 located on the air duct 40 that funnels the wind through the wind turbine 30 to generate the electricity for the building 10. After the wind has gone through the wind generator, it is exhausted through an opening 70. In this embodiment, opening 70 is covered by a grill 80. The grill 80 may be mounted to the exterior of the building 10 and for example, could be located along the eaves of a typical residential structure or commercial building 10. The grill 80 may be of any type

shape, geometry or material as long as it is capable of allowing the exhaust air to leave the building 10.

[0020] In addition, air ducts 40 may have an angled slope 90 which helps to increase the velocity of the air flow coming in through the air intake opening 50 before it hits the wind turbine 30. The angled slope 90 increases velocity of the air and thus aids in the generation of electricity.

[0021] Turning to Figure 3, in yet another embodiment of the present invention, a plurality of air ducts 40 are connected to the structure or building 10 and the enclosure 20. The air ducts 40 may be manufactured with either rigid or of a flexible material 100. In addition, the enclosure 20 and the wind turbine 30 may be located on the exterior of or in close proximity to the building 10 instead of being disposed within the building 10. Figure 3 also illustrates both a typical air exhaust opening 60 and outside air exhaust opening 65. In addition, Figure 3 demonstrates that the airflow to the wind turbine 30 may be delivered in a variety of ways as long as there is sufficient velocity to generate electricity from the wind turbine 30.

[0022] Figure 4 discloses yet another embodiment of the invention, wherein the air ducts 40 may be located either under a structure or building 10 having a pier and beam foundation or within a basement of a building 10, such that air flow may also be obtained from the basement area or may deliver air to the basement area in order to achieve more air velocity through the wind turbine 30. The air duct 45 is connected to the air ducts 40 might be used to create a partial pressure differential in the air flow and, thus, increase the velocity of the air across the wind turbine 30.

[0023] Turning to Figure 5, disclosed therein is that the wind turbine 30 may also be located in a basement area of the building 10 with the exhaust going through grill 110 from the ground itself or through a grate next to the building 10. As shown, there are numerous configurations of the present invention that may be combined without any necessity to use all or any particular configuration to achieve the results of the invention. The varying cross-sectional air ducts 40 may be combined with the air intake scoops 50 or flexible air ducts 100 or not. The wind turbine 30 may be mounted either on the outside of the building 10; the base of the building 10 or in the enclosure 20. Indeed, a plurality of wind turbines 30 may be used in series to generate electricity if the building 10 is large enough to warrant more than one wind turbine. An outside air exhaust 60 or 110 may be used. The configurations are limitless as long as sufficient wind velocity is achieved to generate sufficient cost-effective electricity for the building 10.

[0024] While this invention has been described in reference to illustrative embodiments, this description is not intended to be construed in a limiting sense. Various modifications and combinations of the illustrative embodiments, as well as other embodiments of the invention, will be apparent to persons skilled in the art upon reference to the description. It is therefore intended that the appended claims encompass any such modifications or embodiments.